

USING MATRICES AND YOUR CALCULATOR TO SOLVE SYSTEMS OF EQUATIONS

A system of linear equations can be written in a more abbreviated form using matrices. Here is a system of equations written in matrix form.:

$$\begin{array}{l} 1.5c + 4a = 5050 \\ c + a = 2200 \end{array} \longrightarrow \begin{bmatrix} 1.5 & 4 & 5050 \\ 1 & 1 & 2200 \end{bmatrix}$$

A. Now we're going to **put the matrix into our calculator**:

On your calculator, look at the far left column of buttons. There is a button labeled x^{-1} . Above this button is the command entitled MATRIX (or MATRX). Press the 2nd button and then press the x^{-1} button to gain access to the Matrix menus. After pressing these buttons, your screen should appear as shown.	
At the top of your screen, you'll see the words NAMES, MATH and EDIT. These are names of menus. Use your Right/Left arrow button to highlight the EDIT menu. Highlight the line 1: [A] and press ENTER.	
Enter the dimensions of Matrix A: number of rows then press ENTER; number of columns then press ENTER.	
Enter the elements of Matrix A by highlighting the appropriate cell, typing the number and pressing ENTER. You have now completely entered Matrix A. Notice the cell location at the bottom left corner of your screen.	
We are ready to use these matrices. We'll first return to our Home Screen by using the QUIT command. This is above the MODE button near the top of your calculator. Press 2nd and MODE to access the QUIT command.	

Name _____

Date _____ Block _____

B. Now we're ready to have the calculator **solve the system** of equations represented by the matrix. To do this, we're going to use the "rref" function.

Now, press MATRIX and Right Arrow to the MATH Menu. Down Arrow to command B: rref.	<pre> NAMES NAME EDIT 6:randM(7:augment(8:Matr→list(9>List→matr(0:cumSum(A:rref(B:rref(</pre>
Press ENTER to select this command. Your calculator should take you back to the Home Screen with rref(on the command line. Press MATRIX and select Matrix A. Press the Right Parenthesis button, and then press ENTER. Your solution matrix will appear on your screen. This matrix indicates that the solution is $x = 2$ and $y = -1$.	<pre> rref([A]) [1 0 1500] [0 1 700] </pre>

Each row of this final or reduced matrix can be written back into their equivalent equations. $\begin{bmatrix} 1 & 0 & 1500 \\ 0 & 1 & 700 \end{bmatrix} \longrightarrow \begin{matrix} 1c + 0a = 1500 \\ 0c + 1a = 700 \end{matrix}$ or, more simply, $\begin{matrix} c = 1500 \\ a = 700 \end{matrix}$

So the matrix shows that our answer is

C. We also want to be able to **DELETE** a matrix when we're finished with it. Below are the instructions to delete matrices.

Above the blue + key is a command labeled MEM. Press 2nd and the + key to access the MEM menu. Then highlight 2: Mem Mgmt/Del ... command and press ENTER.	<pre> MEM 1:About 2:Mem Mgmt/Del... 3:Clear Entries 4:ClrAllLists 5:Archive 6:UnArchive 7↓Reset... </pre>
Highlight 5: Matrix and press ENTER.	<pre> RAM FREE 19358 ARC FREE 8582 1:All... 2:Real... 3:Complex... 4>List... 5Matrix... 6↓V-Vars... </pre>
We now see a list containing the three matrices we created. We're going to delete each of these. Using your up/down arrow, move the pointer to [A] and press the DEL key (found immediately to the right of the MODE key). The entry for matrix A will be deleted. You can continue in similar manner for matrices B and C.	<pre> RAM FREE 19358 ARC FREE 8582 ▶ [A] 47 [B] 47 [C] 65 </pre>